Grade Levels 4-8
45-90 Minutes

Grade Level Texas Essential Knowledge and Skills (TEKS) by Content Area:

Mathematics

Grade 4: 4.13A; B; 4.14B; C; D; 4.15A; 4.16A

Grade 5: 5.5A; 5.13A; B; C; 5.14A; B; C; D; 5.15A; 5.16A; B

Grade 6: 6.10A; B; C; D; 6.11A; B; C; D; 6.12B; 6.13A; B

Grade 7: 7.11A; B; 7.12A; B; 7.13A; B; C; D; 7.14B; 7.15B

Grade 8: 8.4; 8.4A; B; 8.12A; B; C; 8.13A; 8.14A; B; C; D; 8.16A; B

Science (Environmental, Ecology) {2009}

Grade 4: 1A; B; 2A; B; C; D; E; F; 3A; 4A; B; 7C

Grade 5: 1A; B; 2A; B; C; D; E; F; G; 3A; 4A; B; 9A; C

Grade 6: 1A; B; 2A; B; C; D; E; 3A; 4A; B

Grade 7: 1A; B; 2A; B; C; D; E; 3A; D; 4A; B; 8C

Grade 8: 1A; B; 2A; B; C; D; E; 3A; D; 4A; B; 11A; D

Social Studies {2010}

Grade 4: 9C, 21B; C; D; 22A; B; C; D; E; 23A; B

Grade 5: 9B; 24B; C; D; 25A; B; C; D; E; 26A; B

Grade 6: 6B; C; 7B; 21B; D; 22A; B; C; D; E; F; 23A; B

Grade 7: 9C; 10A; 21B; C; D; E; F; G; 22A; B; C; D; 23A; B

Grade 8: 29B; C; D; E; F; G; H; I; 30A; B; C; D; 31A; B

Garbage Investigation

Overview

Students analyze beach trash, discuss the problems posed by it and propose solutions to these problems.

Objectives

- Discuss the difference between natural and man-made objects.
- Sort, record, graph, compare and discuss garbage data.
- Problem-solve about garbage issues.

Prerequisites

Unit 1

Vocabulary

recycling
the act of processing used or abandoned materials for use in creating new products.

decompose
to separate into constituent parts or elements or into simpler compounds.

Setting

Indoors/Outdoors *(outdoors is preferred)*

Materials

- **pencils**
- **data card** *(can be found at the end of this lesson)*
- **garbage**
- **tarp** *(if indoors)*
- **journals**
- **graph paper**
- **sturdy gloves for each student**
- **Texas Adopt-A-Beach Cleanup Data** *(can be found at the end of this lesson)*

Developmental Modifications

Use the K-3 journal page for this unit. Young children will need close supervision at the beach and should exercise extreme caution with sharp objects. When picking up garbage, always wear gloves. If appropriate, graph the data as a class.

Background

Beaches are a place to recreate, exercise, socialize, see wildlife and find solitude. They attract tourists and can be an immense draw for those who live near them. Due to human impact, beaches can suffer for a number of reasons, including problems associated with shoreline garbage. *Caution: Students will touch garbage in this activity. Exercise caution when touching garbage! Students should wear gloves. Garbage can be emptied onto a plastic tarp or plastic bag to minimize the mess. If there is a potential for sharp objects, the teacher should sort them out, or responsible, older students can do the sorting. Students should wash their hands when they finish this activity.*

Ways to Address Problems Created Through Beach Litter

Service Learning

Service learning integrates community service work into classroom learning and curriculum. Community issues such as dirty beaches or beach closings can be addressed through service learning. When integrated into a curriculum, the Texas General Land Office Adopt-A-Beach Program cleanups are an example of service learning.

Adopt-A-Beach

Join the Texas General Land Office Adopt-A-Beach Program to create positive change for your beach through litter monitoring along the Texas coast. Beach Guardians (often referred to as adopters) from the Texas Adopt-A-Beach Program make three beach visits per year (although school groups can fulfill their obligation with a single cleanup). Participants analyze data and take action to improve their beach (see the Adopt-A-Beach activity in this unit). More information about the Beach Guardian program can be found at **texasadoptabeach.org**.

Beach Litter Problems

- **Cigarette Butts**
  Cigarette filters are the most numerous item found on Texas beaches and throughout the world. Filters are made of a plastic, cellulose acetate, which can take up to five years to break down and even longer to decompose. Children at play on the beach can put cigarette filters in their mouths. A study has been done showing that the chemicals in cigarettes can be harmful to microorganisms that support other wildlife.

- **Balloons**
  Balloons and their ribbons entangle animals and are sometimes ingested when mistaken for food, causing injury or death. Balloons can also be a problem for boaters if their propellers get tangled up in the string.

- **Food and Food Packaging**
  Bags can entangle animals or be accidentally ingested by them, causing injury or death. Leftover food may attract additional wildlife to the beach, resulting in increased animal droppings, which can lead to high bacteria levels in the water. High bacteria levels are a reason for beach closings.

- **Beverage bottles** *(glass, aluminum, plastic)*
  Broken glass and sharp points on aluminum can injure people as well as wildlife. Sea birds, sea turtles and other marine life often mistake plastic bottles for food, which can be extremely harmful.

- **Fishing line**
  Fishing line can cause wildlife to become entangled, leading to injury or death.

Activities: Part One

1. Give students one minute to think about an experience they have had on a beach or near the shore. In pairs, have students share their experiences with each other for one or two minutes.
2. Ask students, if they have been to the beach, what they like about it. Take a few answers. Ask students what problems they have seen at the beach. The list of answers might include: too crowded, no lifeguards, garbage, dirty, too cold, too hot. Acknowledge as many of these answers as possible. Focus on the garbage issue. Ask students: What do we mean when we say the beach is dirty? This can mean garbage in the water or on the shoreline. How does garbage get to the beach? Human hands are behind garbage on the beach. People can leave trash at a beach or it can be left elsewhere, then blown or washed onto the shore. Trash also makes its way to the beach from inland sources such as sewer overflows and storm drains, landfills, and manufacturing and sewage treatment plants. In the Gulf of Mexico, the currents wreak havoc on our Texas coastline, meaning anything dumped in the Gulf will most likely end up on a Texas beach. Consider giving the example of a student's room. How would you like it if someone came and dumped a load of trash in your room and messed everything up? How would you like to live in that type of environment?
3. Investigation: What do students think is found at beaches? Tell students they are going to investigate what is really found at beaches. Depending on classroom scheduling, here are two options:
   - Bring in a bag of garbage found on a Texas beach.
   - During a class field trip to the beach, have students pick up garbage and bring the bag to class. *Note: Caution students against picking up any sharp objects. Have adult chaperones assist with this.*
4. Have students record data on the garbage they find. Garbage can be sorted and recorded as a class, or divided up and sorted by students in small groups. Use the International Coastal Cleanup Data Card provided (Unit 3, Pages 6 and 7 of the journal pages). To add interest, add a few natural objects that might be found at the beach (feathers, shells, driftwood, etc.) into the mix of garbage for later discussion.
5. Complete and discuss the data analysis questions from the journal pages. Also, discuss the following:
   - Is this all considered garbage? Some items you find can be recycled. Discuss the benefits of recycling and/or reusing an object. If you have put natural objects in with the garbage, discuss the fact that natural objects belong in the ecosystem.
   - How are natural objects different from those produced by people? When natural objects decompose or break down in the ecosystem, they give back to the area in the form of nutrients for decomposers, insects and scavengers. They belong along the shoreline.
   - What problems could garbage create on the beach? Garbage items can cause problems for humans and wildlife. Trash on beaches can: cause people to care less about beaches or feel unhappy about their community, transform a beach into an eyesore, cause health issues, and entangle animals or be accidentally eaten by them, which can cause sickness or death for the animals.
6. What can we do to help solve the problem of garbage on the beach? Carry out what you carry in to beaches, properly dispose of all trash, pick up extra garbage at the beach, recycle and educate others about beach litter issues.
7. Solution list: Based on the class discussion, have students make a list of possible solutions. Students create a list of three things they can do to help reduce garbage on the beach. Students share this list to compile a class solution list *(see page 4 for suggestions)*.

ADOPT A BEACH

Schools and community groups can adopt a stretch of beach through the Beach Guardian program. The commitment includes three cleanups per year, although school groups can fulfill their obligation with one cleanup. Students receive an official Adopt-A-Beach youth patch and certificate of adoption. Supplies are available to Beach Guardians on request.

EDUCATE OTHERS

Explain the problems associated with shoreline trash to other people. Help them see how important it is for each of us to take responsibility for our actions.

TAKE RESPONSIBILITY

Always pick up your garbage, even the small pieces and food waste. Garbage can cause problems for humans and wildlife.

TEXAS GENERAL LAND OFFICE
ADOPT™ BEACH
JERRY PATTERSON, COMMISSIONER

TALK TO LOCAL AND STATE OFFICIALS

Encourage local and state officials to enforce litter laws and support them by providing proper disposal containers and adequate staff.

VOLUNTEER

Participate in the Texas General Land Office Adopt-A-Beach Program's Fall or Spring cleanup events. Each year, coastwide cleanups are held in September and April. Visit texasadopta-beach.org for more information.

PICK UP GARBAGE

Bring an extra garbage bag with you when you go to the beach and spend some time making the area cleaner than when you arrived. This sets a great example for others at the beach. It's contagious—others will follow in your footsteps.

Activities: Part Two

1. Graph the data that you have collected while sorting garbage.
2. Graph the Texas Adopt-A-Beach Program data provided.
3. Compare the graphs of your beach visit data and the data collected during the Adopt-A-Beach Program Fall Cleanup. Remember that you are comparing your site to one that is likely different in size and volunteer numbers.
4. Discuss the following as a class:
   - What is similar about what was found?
   - What is different about what was found?
   - What might account for any differences?
   - Discuss what makes graphing a useful tool. Graphing is a useful tool for comparison because it allows people to see a visual representation of data.
   - What conclusions can you draw from these sets of data?

Wrap-Up

Schools, classrooms, families and individuals can take action against the problem of beach garbage by participating in an Adopt-A-Beach cleanup or by becoming an official Beach Guardian and adopting a mile of coastline. Your school can integrate the idea of "service learning" into the curriculum by addressing the beach issues in this activity. To get involved contact the Texas General Land Office about upcoming Adopt-A-Beach cleanups.

Extension

Explore what happens to the garbage in your school or community.

- Where does it go?
- Is some of it recycled?
- Landfills? Investigate some of the problems associated with solid waste management.
- What are ways that these problems can be addressed within your school or community?

The Texas General Land Office values your thoughts and feedback. Please provide information about any oversights, errors or omissions as well as particular activities that students find interesting. Send comments to the Texas General Land Office Adopt-A-Beach Program at **beach@glo.texas.gov**.

Adapted with permission from **Great Lakes in My World**, *a lesson plan created by the Alliance for the Great Lakes.*

International Coastal Cleanup Data Card

Ocean Conservancy
Start a Sea Change

Thank you for participating in Ocean Conservancy's International Coastal Cleanup (ICC). The commitment you have made today is the first step to ensuring we can enjoy a cleaner ocean all year-round. The data you collect during the Cleanup is invaluable to Ocean Conservancy's effort to start a sea change every day; helping us educate public, business, and government officials about the scale and serious consequences of the global marine debris problem. Thank you. We could not do it without your help!

1. CLEANUP SITE INFORMATION

Category of Cleanup (choose one): ☐ Coastal ☐ Inland Waterway (River/Stream/Tributary/Lake)

Type of Cleanup (choose one): ☐ Beach/Shoreline ☐ Underwater ☐ Watercraft (powerboat, sailboat, kayak or canoe)

Location of Cleanup: State _____ Country _____

Province _____ Zone or County Cleaned _____

Cleanup Site Name (beach, park, etc.) _____

Today's Date: Month: _____ Day _____ Year _____ Name of Coordinator _____

Number of People Working on This Card _____ Distance Cleaned _____ miles or _____ km

Number of Trash Bags Filled _____ Total Estimated Weight Collected _____ lbs. or _____ kgs.

Estimated Time Spent on Cleanup _____

2. CONTACT INFORMATION (EACH INDIVIDUAL TEAM MEMBER)

1. Name _____
   Email Address _____
2. Name _____
   Email Address _____
3. Name _____
   Email Address _____
4. Name _____
   Email Address _____

3. ENTANGLED ANIMALS

List all entangled animals found during the Cleanup. Record the type of debris they were entangled in, for example: fishing line, fishing nets, balloon string/ribbon, crab/lobster/fish traps, plastic bags, rope, six-pack rings, wire and other items (please specify).

Animal	Alive/Released or Dead	Entanglement Debris

4. WHAT WAS THE MOST PECULIAR ITEM YOU COLLECTED? _____

The following national and international organizations endorse and/or support the International Coastal Cleanup
- NOAA-Marine Debris Program
- U.S. Environmental Protection Agency
- UNEP – United Nations Environment Programme
- IUCN-The World Conservation Union
- Intergovernmental Oceanographic Commission (IOC) of the United Nations' Educational, Scientific, and Cultural Organization (UNESCO)

Please return this card to your area coordinator or mail it to:

Ocean Conservancy
1300 19th Street, NW
8th Floor
Washington, DC 20036

www.oceanconservancy.org

OCEAN CONSERVANCY'S
International Coastal Cleanup

ITEMS COLLECTED

Please pick up ALL debris that you find. Only record information for the items listed below.
Keep a count of your items using tick marks and enter the item totals in the box.

Example: 8 **Beverage Cans** 𝍸 III

SHORELINE AND RECREATIONAL ACTIVITIES

Debris from fast food, beach-goers, sports/games, festivals, litter from streets/storm drains, etc.

- ☐ Bags (Paper)
- ☐ Bags (Plastic)
- ☐ Balloons
- ☐ Beverage Bottles (Plastic) 2 liters or less
- ☐ Glass Beverage Bottles
- ☐ Beverage Cans
- ☐ Caps, Lids
- ☐ Clothing, Shoes
- ☐ Cups, Plates, Forks, Knives, Spoons
- ☐ Food Wrappers/Containers
- ☐ Pull Tabs
- ☐ 6-Pack Holders
- ☐ Shotgun Shells/Wadding
- ☐ Straws, Stirrers
- ☐ Toys

OCEAN/WATERWAY ACTIVITIES

Debris from recreational/commercial fishing and boat/vessel operations

- ☐ Bait Containers/Packaging
- ☐ Bleach/Cleaner Bottles
- ☐ Buoys/Floats
- ☐ Crab/Lobster/Fish Traps
- ☐ Crates
- ☐ Fishing Line
- ☐ Fishing Lures/Light Sticks
- ☐ Fishing Nets
- ☐ Light Bulbs/Tubes
- ☐ Oil/Lube Bottles
- ☐ Pallets
- ☐ Plastic Sheeting/Tarps
- ☐ Rope
- ☐ Strapping Bands

SMOKING-RELATED ACTIVITIES

- ☐ Cigarettes/Cigarette Filters
- ☐ Cigarette Lighters
- ☐ Cigar Tips
- ☐ Tobacco Packaging/Wrappers

DUMPING ACTIVITIES

- ☐ Appliances (refrigerators, washers, etc.)
- ☐ Batteries
- ☐ Building Materials
- ☐ Cars/Car Parts
- ☐ 55-Gal. Drums
- ☐ Tires

DEBRIS ITEMS OF LOCAL CONCERN

Identify and count 3 other items found that concern you

- ☐
- ☐
- ☐

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Name:_____ **Date** _____

Unit 3 | "Garbage Investigation" Journal Pages

DATA ANALYSIS

Using the ICC data card provided, answer the following questions about the trash you collected.

1. What did you find the most of? Where did it come from?

2. What did you find the least of?

3. What category was the most popular for items that you found? (Check one)
   - ❍ Recreational Activities (evidence of people having fun at the beach)
   - ❍ Fishing/Boating (trash from commercial fishing or boat/vessel activities)
   - ❍ Smoking-related (cigarette filters, lighters, packaging)
   - ❍ Dumping (old appliances, batteries, car parts, tires)
   - ❍ Eating (food wrappers, food packaging, napkins, utensils)

4. What surprised you about what you found? How did it make you feel?

5. What problems might be created by shoreline trash? List two to four problems.

6. What three solutions do you think could help solve the problem of beach litter?

Name:_____ **Date** _____

Unit 3 | "Garbage Investigation" Journal Pages

VISUAL DATA ANALYSIS

1. Draw the object you found most often. Label it.

2. How many did you find?

_____

_____

3. Draw the most unusual object that you found. Label it.

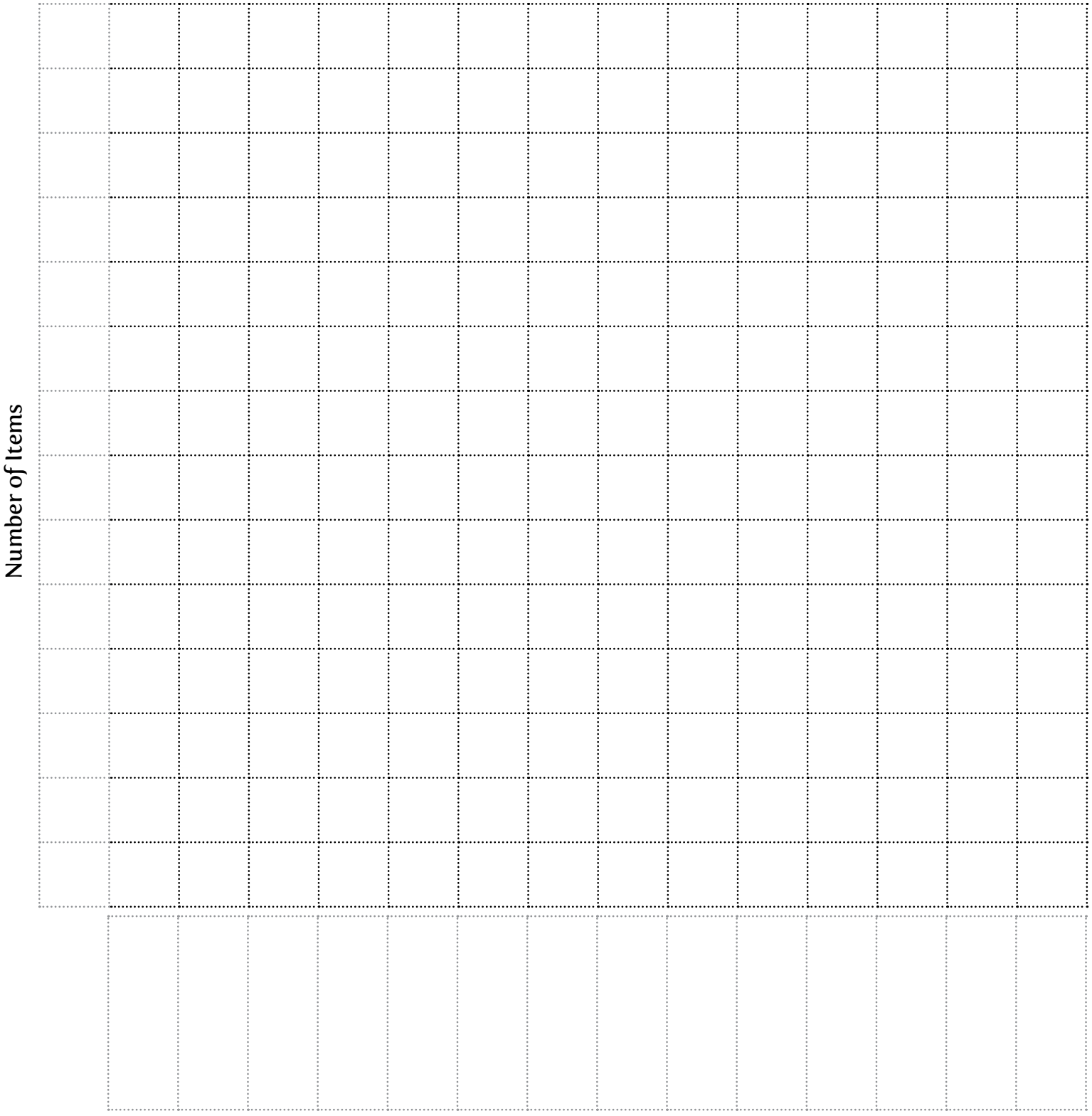
4. Draw a clean beach. Include any animals and plants you think might live there.

Name:_____ **Date** _____

Unit 3 | "Garbage Investigation" Journal Pages

GRAPHING YOUR DATA

Make a bar graph of the data you collected. If you have many types of items, you may want to group them into categories (e.g., recreational activities, food-related, fishing/boating, smoking-related, etc.).



Name:_____ Date _____

Unit 3 | Data

TEXAS ADOPT-A-BEACH CLEANUP DATA

Categorized Items	Total Items	Percent of Total
Shoreline and Recreational Activities		
bags (paper)	5,308	2.69%
bags (plastic)	16,350	8.28%
balloons	3,335	1.69%
beverage bottles (plastic; 2 liters or less)	17,499	8.86%
glass beverage bottles	6,822	3.46%
beverage cans	10,063	5.10%
caps, lids	30,927	15.66%
clothing, shoes	3,647	1.85%
cups, plates, forks, knives, spoons	9,600	4.86%
food wrappers/containers	12,640	6.40%
pull tabs	2,777	1.41%
6-pack holders	739	0.37%
shotgun shells/wadding	791	0.40%
straws, stirrers	8,244	4.18%
toys	2,355	1.19%
Category Totals	131,097	66.40%

Name:_____ **Date** _____

Unit 3 | Data

TEXAS ADOPT-A-BEACH CLEANUP DATA

Categorized Items	Total Items	Percent of Total
Ocean/Waterway Activities		
bait containers/packaging	990	0.50%
bleach/cleaner bottles	834	0.42%
buoys/floats	765	0.39%
crab/lobster/fish traps	337	0.17%
crates	155	0.08%
fishing line	3,743	1.90%
fishing lures/light sticks	1,204	0.61%
fishing nets	898	0.45%
light bulbs/tubes	343	0.17%
oil/lube bottles	813	0.41%
pallets	152	0.08%
plastic sheeting/tarps	2,025	1.03%
rope	6,211	3.15%
strapping bands	1,160	0.59%
Category Totals	19,630	9.95%

Name:_____ **Date** _____

Unit 3 | Data

TEXAS ADOPT-A-BEACH FALL CLEANUP DATA

Categorized Items	Total Items	Percent of Total
Smoking-Related Activities		
cigarettes/cigarette filters	35,741	18.10%
cigarette lighters	951	0.48%
cigar tips	3,672	1.86%
tobacco packaging/wrappers	1,221	0.62%
Category Totals	41,585	21.06%
Dumping Activities		
appliances	70	0.04%
batteries	236	0.12%
building materials	2,490	1.26%
cars/car parts	421	0.21%
55-gallon drums	31	0.02%
tires	373	0.19%
Category Totals	3,621	1.83%

Name:_____ **Date** _____

Unit 3 | "Garbage Investigation" Journal Pages

GRAPHING TEXAS ADOPT-A-BEACH FALL CLEANUP DATA

Make a bar graph of the Adopt-A-Beach Fall Cleanup data. You may want to group items into categories (e.g., recreational activities, food-related, fishing/boating, smoking-related, etc.).